WHAT IS CLAIMED IS:

1. A method of detecting a tone in a signal, comprising:
selectively analyzing spectral content of the signal;
generating an indicator if the analyzed spectral content of the signal satisfies a criteria;
monitoring a temporal characteristic of the indicator; and
detecting the tone based on the monitored temporal characteristic.

2. The method of claim 1 further comprising filtering the signal before analyzing the spectral characteristic.

3. The method of claim 2 wherein the filtering comprises removing frequency components in the signal above a threshold.

4. The method of claim 2 further comprising downsampling the filtered signal before analyzing the spectral characteristic.

5. The method of claim 4 further comprising estimating power of the downsampled signal, comparing the estimated power with at least one threshold, and invoking the spectral content analysis based on the comparison.

6. The method of claim 5 wherein the comparison of the estimated power with said at least one threshold comprises generating a series of power indicators over time, the spectral content analysis being invoked upon the generation of consecutive power indicators each satisfying a power criteria.

7. The method of claim 6 wherein the spectral content analysis comprises differentially detecting a frequency of the downsampled signal.

8. The method of claim 7 wherein the spectral content analysis comprises estimating a mean and variance of the estimated frequency, and comparing the estimated mean and variance to at least one frequency threshold.

9. The method of claim 1 wherein the monitoring of the temporal characteristic of the indicator comprises estimating a duration of the indicator over time, and comparing the estimated duration to at least one threshold, the tone detection being based on the comparison.

10 A method for detecting tones in a composite signal having a plurality of components, comprising:

separating the components of the composite signal;

analyzing spectral content for each of the separated components;

selectively generating an indicator for each of the separated components whose spectral content satisfies a respective criteria;

monitoring a temporal characteristic for each of the indicators; and

detecting the tones in the composite signal based on the monitored temporal characteristics.

11 The method of claim 10 further comprising filtering the composite signal.

12. The method of claim 11 wherein the filtering of the composite signal comprises removing frequency components in the composite signal above a threshold.

13. The method of claim 11 further comprising downsampling the filtered composite signal.

14. The method of claim 13 wherein the separation of the components of the composite signal comprises bandpass filtering the downsampled composite signal.

15. The method of claim 14 wherein the bandpass filtering of the downsampled composite signal comprises converting each of the separated components into a complex component.

16. The method of claim 10 further comprising estimating power for each of the components, comparing the estimated power for each of the components with at least one respective threshold, and invoking the spectral content analysis for each component based on the comparison.

17. The method of claim 16 wherein the comparison comprises generating a series of power indicators over time for each component, the spectral content analysis for each component being invoked upon the generation of respective consecutive power indicators each satisfying a power criteria.

18. The method of claim 17 wherein the spectral content analysis for each of the components comprises differentially detecting a frequency of each for the components.

19. The method of claim 18 wherein the spectral content analysis comprises estimating a mean and variance of the estimated frequency for each of the components, and comparing the estimated mean and variance to at least one respective threshold.

20. The method of claim 10 wherein the monitoring of the temporal characteristic for each of the indications comprises estimating a duration of the respective indicator over time, and comparing the estimated duration for each of the components to at least one respective threshold, the tone detection being based on the comparison.

21. A system for detecting a tone in a signal, comprising:

a signal processor to selectively analyze spectral content of the signal and generate an indicator if the spectral content of the signal satisfies a criteria; and

a cadence processor to monitor a temporal characteristic of the indicator and detect the tone based on the temporal characteristic.

22. The system of claim 21 wherein the signal processor comprises a low pass filter to filter the signal, and a downsampler to decimate the filtered signal, the decimated signal being analyzed for spectral content.

23. The system of claim 22 wherein the tone comprises one of a plurality of tones each having a frequency, and wherein the low pass filter removes frequency components in the signal above the highest frequency.

24. The system of claim 21 wherein the signal processor comprises a differential detector to analyze the spectral content of the signal by estimating a frequency for the signal.

25. The system of claim 24 wherein the signal processor further comprising a power estimator to estimate power of the signal and to generate a power indicator based on the power estimation, and a power state machine to enable the differential detector based on the power indicator.

26. The system of claim 21 wherein the cadence processor comprises a cadence state machine responsive to the indicator, a counter enabled by the cadence state machine and which estimates cadence of the indicator, and cadence logic to compare the cadence of the indicator to at least one threshold to detect the tone.

27. A system for detecting tones in a composite signal having a plurality of components, comprising:

a plurality of bandpass filters to separate the components of the composite signal;

a plurality of differential detectors each which estimates a frequency for one of the components;

a plurality of frequency calculators each which analysis a mean and variance of the estimated frequency for one of the components and generates a tone indicator as a function of the analysis; and

a cadence processor that monitors a temporal characteristic of each of the tone indicators and detects the tones in the composite signal based on the temporal monitoring.

28. The system of claim 27 further comprising a downsampler to decimate the composite signal before the composite signal is separated into its components by the bandpass filters .

29. The system of claim 27 wherein the bandpass filters each comprises a complex filter.

30. The system of claim 27 further comprising a plurality of power estimators each which estimate power for one of the components and generates a power indicator as a function of the estimation, and a plurality of power state machines each which monitors the power indicator for one of the components and invokes a respective one of the frequency calculators in response thereto.

31. The system of claim 27 wherein the cadence processor comprises a cadence state machine responsive to the tone indicators, a counter to estimate cadence of the tone indicators, and cadence logic which compares the cadence of the tone indicators to at least one respective threshold to detect the tones in the composite signal.

32. A data transmission system, comprising:

a telephony device which outputs a signal; and

a data exchange coupled to the telephony device, the data exchange comprising a signal processor to selectively analyze spectral content of the signal and generate an indicator if the spectral content of the signal satisfies a criteria, and a cadence processor to monitor a temporal characteristic of the indicator and detect the tone based on the temporal characteristic.

33. The data transmission system of claim 32 wherein the signal processor comprises a low pass filter to filter the signal, and a downsampler to decimate the filtered signal, the decimated signal being analyzed for spectral content.

34. The data transmission system of claim 33 wherein the tone comprises one of a plurality of tones each having a frequency, and wherein the low pass filter removes frequency components in the signal above the highest frequency.

35. The data transmission system of claim 32 wherein the signal processor comprises a differential detector to analyze the spectral content of the signal by estimating a frequency for the signal.

36. The system of claim 35 wherein the signal processor further comprising a power estimator to estimate power of the signal and to generate a power indicator based on the power estimation, and a power state machine to enable the differential detector based on the power indicator.

37. The system of claim 32 wherein the cadence processor comprises a cadence state machine responsive to the indicator, a counter enabled by the cadence state machine and which estimates cadence of the indicator, and cadence logic to compare the cadence of the indicator to at least one threshold to detect the tone.

38. The data transmission system of claim 32 wherein the telephony device comprises a telephone.

39. The data transmission system of claim 32 further comprising a public switched telephone network coupling the telephony device to the data exchange.

40. A system for detecting a tone in a signal, comprising:

analyzing means for selectively analyzing spectral content of the signal and generating an indicator if the spectral content of the signal satisfies a criteria; and

detection means for monitoring a temporal characteristic of the indicator and detecting the tone based on the temporal characteristic.

41. The system of claim 40 wherein the analyzing means comprises filtering means for filtering the signal, and means for decimating the filtered signal, the decimated signal being analyzed for spectral content.

42. The system of claim 41 wherein the tone comprises one of a plurality of tones each having a frequency, and wherein the filtering means removes frequency components in the signal above the highest frequency.

43. The system of claim 40 wherein the analyzing means comprises a differential detector for analyzing the spectral content of the signal by estimating a frequency for the signal.

44. The system of claim 43 wherein the analyzing means further comprising means for estimating power of the signal and generating a power indicator based on the power estimation, and means for enabling the differential detector based on the power indicator.

45. The system of claim 40 wherein the detection means comprises means for estimating cadence of the indicator, and means for comparing the cadence of the indicator to at least one threshold to detect the tone.

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46. A system for detecting tones in a composite signal having a plurality of components, comprising:

separation means for separating the components of the composite signal;

frequency estimation means for estimating a frequency for each one of the components;

analyzing means for analyzing a mean and variance of the estimated frequency for one of the components and generating a tone indicator as a function of the analysis; and

detection means for monitoring a temporal characteristic of each of the tone indicators and detecting the tones in the composite signal based on the temporal monitoring.

47. The system of claim 46 further comprising means for decimating the composite signal before the composite signal is separated into its components by the separation means.

48. The system of claim 46 wherein the separation means comprises a plurality of bandpass filters.

49. The system of claim 48 wherein the bandpass filters each comprises a complex filter.

50. The system of claim 46 further comprising means for estimating power for each of the components and generating a power indicators based on the estimation, and means for monitoring the power indicators and invoking the frequency estimation means in response thereto.

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51. The system of claim 46 wherein the detection means comprises means for estimating cadence of the tone indicators, and means for comparing the cadence of the tone indicators to at least one threshold to detect the tones in the composite signal.

52 Computer-readable media embodying a program of instructions executable by a computer to perform a method of detecting a tone in a signal, the method comprising:

selectively analyzing spectral content of the signal;

generating an indicator if the analyzed spectral content of the signal satisfies a criteria;

monitoring a temporal characteristic of the indicator; and

detecting the tone based on the monitored temporal characteristic.

53. The computer-readable media of claim 52 wherein the method further comprises filtering the signal before analyzing the spectral characteristic.

54. The computer-readable media of claim 53 wherein the filtering comprises removing frequency components in the signal above a threshold.

55. The computer-readable media of claim 53 wherein the method further comprises downsampling the filtered signal before analyzing the spectral characteristic.

56. The computer-readable media of claim 55 wherein the method further comprises estimating power of the downsampled signal, comparing the estimated power with at least one threshold, and invoking the spectral content analysis based on the comparison.

57. The computer-readable media of claim 56 wherein the comparison of the estimated power with the at least one threshold comprises generating a series of power indicators over time, the spectral content analysis being invoked upon the generation of consecutive power indicators each satisfying a power criteria.

58. The computer-readable media of claim 57 wherein the spectral content analysis comprises differentially detecting a frequency of the downsampled signal.

59. The computer-readable media of claim 58 wherein the frequency detection comprises estimating a mean and variance of the frequency of the downsampled signal, and comparing the estimated mean and variance to at least one frequency threshold.

60. The computer-readable media of claim 52 wherein the monitoring of the temporal characteristic of the indicator comprises estimating a duration of the indicator over time, and comparing the estimated duration to at least one threshold, the tone detection being based on the comparison.

61. Computer-readable media embodying a program of instructions executable by a computer to perform a method of detecting tones in a composite signal having a plurality of components, the method comprising:

separating the components of the composite signal;

analyzing spectral content for each of the separated components;

selectively generating an indicator for each of the separated components whose spectral content satisfies a respective criteria;

monitoring a temporal characteristic for each of the indicators; and

detecting the tones in the composite signal based on the monitored temporal characteristics.

62 The computer-readable media of claim 61 wherein the method further comprises filtering the composite signal.

63. The computer-readable media of claim 62 wherein the filtering of the composite signal comprises removing frequency components in the composite signal above a threshold.

64. The computer-readable media of claim 62 wherein the method further comprises downsampling the filtered composite signal.

65. The computer-readable media of claim 64 wherein the separation of the components of the composite signal comprises bandpass filtering the downsampled composite signal.

66. The computer-readable media of claim 65 wherein the bandpass filtering of the downsampled composite signal comprises converting each of the separated components into a complex component.

67. The computer-readable media of claim 61 wherein the method further comprises estimating power for each of the components, comparing the estimated power for each of the components with at least one respective threshold, and invoking the spectral content analysis for each component based on the comparison.

68. The computer-readable media of claim 67 wherein the comparison comprises generating a series of power indicators over time for each component, the spectral content analysis for each component being invoked upon the generation of respective consecutive power indicators each satisfying a power criteria.

69. The computer-readable media of claim 68 wherein the spectral content analysis for each of the components comprises differentially detecting a frequency of each for the components.

70. The computer-readable media of claim 69 wherein the frequency detection comprises estimating a mean and variance of the frequency for each of the components, and comparing the estimated mean and variance to at least one respective threshold.

71. The computer-readable media of claim 61 wherein the monitoring of the temporal characteristic for each of the indications comprises estimating a duration of the respective indicator over time, and comparing the estimated duration for each of the components to at least one respective threshold, the tone detection being based on the comparison.